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Two new species of *Passalora* and *Pseudocercospora* from northeastern Uttar Pradesh, India

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Abstract — During surveys of hyphomycetes from northeastern Uttar Pradesh, India, two undescribed taxa were discovered, *Passalora barringtoniigena* sp. nov. on living leaves of *Barringtonia acutangula* (*Lecythidaceae*), and *Pseudocercospora miliusae* sp. nov. on *Miliusa tomentosa* (*Annonaceae*). These two species differ from similar species morphologically. Illustrations and descriptions of the new species are provided.

Key words — biodiversity, foliar diseases, phytopathogenic fungi, taxonomy

Introduction

We have encountered several plant species exhibiting leaf blights during our survey of plant diseases. Critical examination and a thorough survey of the literature revealed that two of these blights were caused by two undescribed species of *Passalora* and *Pseudocercospora. Passalora* is characterised by septate coloured conidia and conidiophores with thickened scars, and *Pseudocercospora* is characterised by septate coloured conidia and conidiophores without thickened scars (Crous & Braun 2003). After comparing the fungi with all other species reported on allied hosts, we found them to be distinct and identified them as new species of *Passalora* and *Pseudocercospora*.

Materials & methods

Infected leaf samples from different parts of northeastern Uttar Pradesh were placed in separate polythene bags and taken to the laboratory. Surface scrapings and free-hand cut sections were prepared from infected portions of the leaf samples and mounted in lactophenol cotton blue on microscope slides. Fungal structures were drawn under 1000× magnification with the help of camera lucida to illustrate all possible details of morphology and ontogeny of reproductive propagules. Measurements were taken with the help of an ocular micrometer. Morphotaxonomic determinations were made with the help of current literature and available resident expertise. Holotypes have been

deposited in HCIO (Herbarium Cryptogamiae Indiae Orientalis), Indian Agricultural Research Institute, New Delhi, India; isotypes were retained in the departmental herbarium for further reference.

Taxonomy

Passalora barringtoniigena R. Singh, Sham. Kumar & Kamal, **sp. nov.** Fig. 1

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Maculae hypogenae, atro-brunneae vel nigrae. Coloniae hypophyllae, effusae. Mycelium internum. Stromata parva. Conidiophora macronematosa, ex hyphis oriunda singulata vel 2–6-fasciculata, simplicia, erecta vel procumbentia, recta vel flexuosa, geniculata, laevia, crassitunicata, pallide brunnea vel atro-brunnea, 2–7-septata, 22–105 × 3–6 µm. Cellulae conidiogenae integratae, terminales vel intercalares, polyblasticae, cicatricatae, cicatrices incrassatae. Conidia simplicia, sicca, acropleurogena, solitaria, cylindricata, 3–11-septata, recta vel leniter curvata, olivacea vel olivaceo-brunnea, laevia, tenui-tunicata, apices obtusae, ad basim obconicotruncata, hila incrassata, 35–82 × 2–6 µm, hila 1.5–2.5 µm lata.

Type: On living leaves of *Barringtonia acutangula* (L.) Gaertn. (*Lecythidaceae*), Nichlaul Forest, Mahrajganj (U.P.), India, January 2008, coll. Raghvendra Singh, HCIO No. 48783 (**holotype**), GPU Herb. No. KSR-257 (**isotype**).

Etymology: the epithet is derived from the genus name of the host.

Infection spots hypogenous, minute, dark brown to black. Colonies hyphophyllous, effuse. Mycelium internal. Stromata absent or poorly developed. Conidiophores macronematous, arising singly from internal hyphae or in a fascicle of 2–6 from poorly developed stromata, simple, erect to procumbent, straight to flexuous, geniculate, smooth, thick-walled, light to dark brown, 2–7-septate, 22–105 × 3–6 µm. Conidiogenous cells integrated, terminal, becoming intercalary, polyblastic, cicatrized with thickened conidial scars. Conidia simple, dry, acropleurogenous, solitary, cylindrical, 3–11-septate, straight to slightly curved, olivaceous to olivaceous-brown, smooth, thin-walled, apex obtuse, base obconico-truncate, hila thickened, 35–82 µm long and 2–6 µm thick, germinating conidia present, hila 1.5–2.5 µm wide.

Two *Passalora* species previously described on *Barringtonia* are *P. barringtoniicola* (Y.L. Guo) U. Braun & Crous (Crous & Braun 2003) on *B. yunnanensis* from China and *P. barringtoniae-acutangulae* (Kamal et al.) Poonam Srivast. (Srivastava 1994) on *B. acutangula* from India and Australia. *Passalora barringtoniicola* differs from *P. barringtoniigena* in having obclavato-cylindrical, catenate conidia with long curved tips and conidiophores that are densely fasciculate and arise from well-developed subepidermal stromata (Crous & Braun 2003). In *P. barringtoniae-acutangulae* the stromata are well developed, the conidiophores are longer (≤ 240 µm), and the conidia are shorter and wider (17.5–38.6 × 4.2–11.7 µm), 0–3-septate, and obclavate to broadly fusiform (Srivastava 1994).

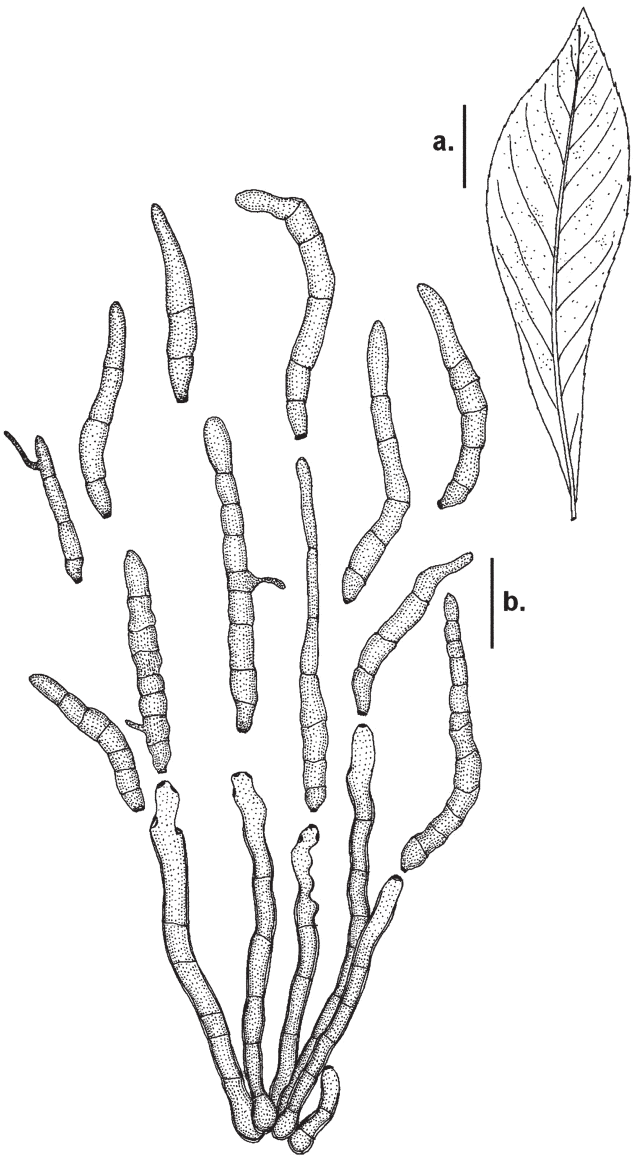

Fig. 1. *Passalora barringtoniigena*.
a: symptoms; b: conidia, germinating conidia, and conidiophores.
(Scale bars: a = 20 mm, b = 20 μm).

Pseudocercospora miliusae R. Singh, Sham. Kumar & Kamal, **sp. nov.** Fig. 2

MycoBank MB 519075

Maculae amphigenae, primo discretae, venulis definitae, demum coalescentes, irregulares et plus minusve, nigrae vel brunneae, 1–21 mm in diam. Coloniae hypophyllae, effusae, brunneae. Mycelium internum. Stromata subepidermalia vel erumpentia, pseudoparenchymatica, 17–21 × 36–42 µm. Conidiophora ex hyphis oriunda singulata vel 2–50-fasciculata, macronematosa, simplicia, cylindricata, erecta vel procumbentia, recta vel curvata, laevia, crassitunicata, ramosa, pallide brunnea, 1–2-septata, 10–70 × 2–5 µm. Cellulae conidiogenae integratae, terminales, monoblasticae, cicatrices non incrassatae. Conidia simplicia, tenui-tunicata, sicca, acropleurogena, recta vel curvata, non ramosa, cylindricata vel obclavata, 0–4-septata, apices subacuta vel acuta, ad basim obconicotruncata vel rotundata, pallide brunnea, 20–58 × 2–3 µm, hila non incrassata, 1–1.5 µm lata.

Type: On living leaves of *Miliusa tomentosa* (Roxb.) J. Sinclair (*Annonaceae*), Vindhyavashini Park, Gorakhpur (U.P.), India, January 2008, coll. Raghvendra Singh, HCIO No. 48786 (**holotype**), GPU Herb. No. KSR-320 (**isotype**).

Etymology: the epithet is derived from the genus name of the host.

Infection spots amphigenous, discrete and vein-limited in the beginning but coalescing to become irregular and more or less necrotic afterwards, black to brown, 1–21 mm in diam. Colonies hypophyllous, effuse, brown. Mycelium internal. Stromata subepidermal to erumpent, pseudoparenchymatous, 17–21 × 36–42 µm. Conidiophores arising singly from internal hyphae or in a fascicle of 2–50 from subepidermal or erumpent stromata, macronematous, simple, erect to procumbent, cylindrical, smooth-walled, thick-walled, branched, light brown, 1–2-septate, 10–70 × 2–5 µm. Conidiogenous cells integrated, terminal, monoblastic, scars unthickened. Conidia simple, thin-walled, dry, acropleurogenous, straight to curved, unbranched, cylindrical to obclavate, 0–4-septate, apex subacute to acute, base obconicotruncate to rounded, light brown, 20–58 × 2–3 µm, hila unthickened, 1–1.5 µm wide.

A thorough survey of the literature indicates that no other *Pseudocercospora* species has been described on *Miliusa tomentosa,* and only one, *Ps. annonacea* (Kamal et al.) U. Braun (Braun 1994), has been described on any *Miliusa* species. In addition to the different host species, *Ps. annonacea* is separated by conidia that are larger (57.5–115 × 3.45–4.6 µm), pluriseptate (up to 15–20-septate) and hyaline. The only other cercosporoid species described on *Miliusa tomentosa, Passalora miliusae* U. Braun & Crous (Crous & Braun 2003), has subhyaline conidia and thickened conidiophore scars.

Pseudocercospora species known to occur the same host family (*Annonaceae*) differ from *Ps. miliusae* as noted below.

In *Ps. aethiopicae* Deighton, conidiophores are shorter (10–40 µm) and always densely fasciculate, never solitary (Deighton 1976).

In *Ps. annonae* U. Braun & Crous conidia (50–150 µm) and conidiophores (20–110 µm) are longer (Braun et al. 2002).

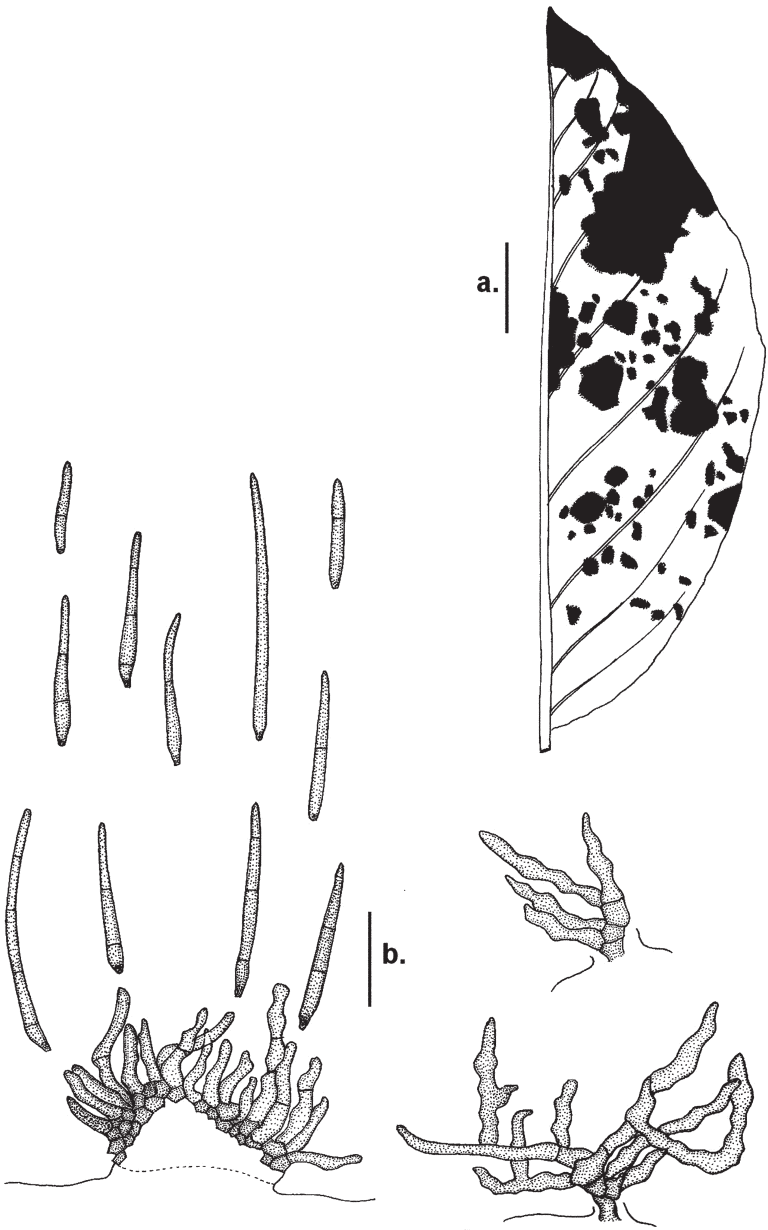

Fig. 2. *Pseudocercospora miliusae.*
a: symptoms; b: conidia, stroma, and simple and branched conidiophores.
(Scale bars: a = 20 mm, b = 20 μm).

In *Ps. annonae-squamosae* U. Braun & R.F. Castañeda, conidia are longer (≤ 75(–85) µm) and 3–7-septate, and the shorter (≤ 30(–45) µm) conidiophores arise singly from superficial hyphae on the lower leaf surface to form large dense (sometimes almost sporodochial) fascicles with well-developed stromata on the upper leaf surface (Braun & Crous 2008).

Pseudocercospora annonarum (Petr. & Cif.) U. Braun & Crous is readily separated by the presence of synnemata (80–250 × 20–50 µm) and conidia that are ellipsoid to ovoid, variably (0–10)-septate, and broader [≤ 8(–9) µm diam.] (Braun & Crous 2008).

In *Ps. annonifolii* (Bat. & Peres) U. Braun & F.O. Freire, the conidiophores are shorter (≤ 20–(30) µm) and conidia longer (≤ 220 µm) (Braun & Freire 2003).

The shorter (6–20 µm) conidiophores of *Ps. asiminae* (Ellis & Morgan) U. Braun & Crous arise from both substomatal and superficial hyphae and the conidia are variably shaped (ellipsoid-ovoid to fusiform), longer (20–80 µm), and with 1–9 transverse (plus occasionally 1–2 longitudinal or oblique) septa and an obtuse apex (Braun & Crous 2008).

The conidia of *Ps. asiminae-pygmaeae* U. Braun are larger (25–140 × 3–6(–7) µm) (Braun & Crous 2008).

Pseudocercospora oblecta (Syd.) Crous & U. Braun possesses sporodochia, shorter (30–50 µm) verruculose conidiophores that taper to a rounded or subtruncate apex of conidiogenous cells that proliferate 1–4 times percurrently, and longer (40–120 µm) verruculose conidia with 1–15 septa and guttules (Braun & Crous 2008).

In *Ps. polyalthiae* J.M. Yen et al. the conidiophores are consistently solitary and arise from superficial hyphae, and the conidia are 3–13-septate and longer (40–156 µm) (Yen et al. 1982).

Pseudocercospora scitula (Syd.) Deighton produces longer conidia (50–110 × 5–8 µm) and conidiophores (60–220 × 4–6 µm) (Deighton 1976).

In *Ps. xenoannonicola* Crous & Bench. both external as well as internal mycelium is present, conidiophores are shorter (10–30 × 3–4 µm), and conidia are longer (30–100 × 2–3 µm) and 5–7-septate (Crous et al. 2000).

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